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FEDERAL-STATE COOPERATIVE SNOW SURVEYS and IRRIGATION WATER FORECASTS

FOR
RIO GRANDE DRAINAGE BASIN
April 1, 1949



by
Division of Irrigation, Soil Conservation Service
United States Department of Agriculture
and
Colorado Agricultural Experiment Station

Data included in this report were obtained by the agencies herein named in cooperation with the U.S. Forest Service,
National Park Service, State Engineers of Colorado and New Mexico and other Federal State and local organizations.



APRIL 1, 1949

Water Supply Outlook

Rio Grande and Canadian River Drainage Basins

The water supply outlook for irrigated areas served by the Rio Grande and its tributaries in San Luis Valley was well above normal as shown by April 1 snow surveys. Most of the snow courses have the highest snow-water content recorded for this date since snow surveys were started in 1937. Along the Sangre de Cristo Range to the east of the Valley snow cover is slightly above normal. Recent precipitation in the Valley has been about normal and soil moisture conditions are fair to good. On the headwaters of the Pecos and Rio Grande tributaries to the east of the river in New Mexico summer runoff will be normal or slightly below. Snow cover on the Canadian River tributaries is about normal and somewhat less than a year ago.

RIO GRANDE

Snow accumulation along the Continental Divide to the west of San Luis Valley is very high and generally greater than for any April 1 snow survey since the program was started in 1937. The current average snow-water contents are slightly higher than for April 1, 1941. Total runoff on the Rio Grande, Alamosa and Conejos Rivers is expected to be about the same as for 1941 and for the Rio Grande at Del Norte slightly more than for the 1948 season. Peak flow of these streams is also expected to be high, but the rate will be materially affected by April snow accumulation and temperatures at melting time. Snow surveys will be made on April 15 and May 1 to check these probabilities. Based on current data there is about an even chance that peak flow in the Rio Grande will exceed the 1941 peak, and about one chance in five that the 1948 peak will be exceeded. On the Alamosa and Conejos Rivers there is about a 2 to 1 chance that 1949 peak flows will be greater than for 1941. Reservoir storage on the valley streams is about the same as a year ago. Soil moisture in the valley area has been dry during the winter but was substantially improved during the storm about April 1.

Snow conditions along the Upper Rio Chama are similar to the Rio Grande. The flow of the river into El Vado reservoir is expected to be slightly less than for 1941. Peak flow of the stream past the Park View gaging station has an even chance of exceeding 1941. El Vado Reservoir has been drained down to 19,000 acre feet and should be able to control peak flows below the reservoir. For the Rio Grande at Otowi Bridge the April-September

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flow is expected to be about 1,500,000 acre feet. Peak flow at this point for next season has only once chance in five of exceeding 1941. The most probable peak flow, based on current data, is about 18,000 second-feet, but past records have indicated that it may vary 30 percent above and below this figure.

Snow cover is normal or less on the tributaries to the Rio Grande east of the River in Northern New Mexico. Soil moisture conditions are described as good to excellent in the Albuquerque area. Stream flow is above normal.

The combined storage in Elephant Butte and Caballo Reservoirs is now 689,000 acre feet as compared to 566,000 on April 1, 1943. There should be a substantial increase in storage this season. Soil moisture conditions in the lower Rio Grande Valley are reported as only fair due to recent precipitation deficiency.

On the headwaters of the Pecos River snow cover is rather light, much less than a year ago. However, due to early winter snow, summer runoff should be only slightly under normal. Soil moisture conditions on the Carlsbad project are reported as good.

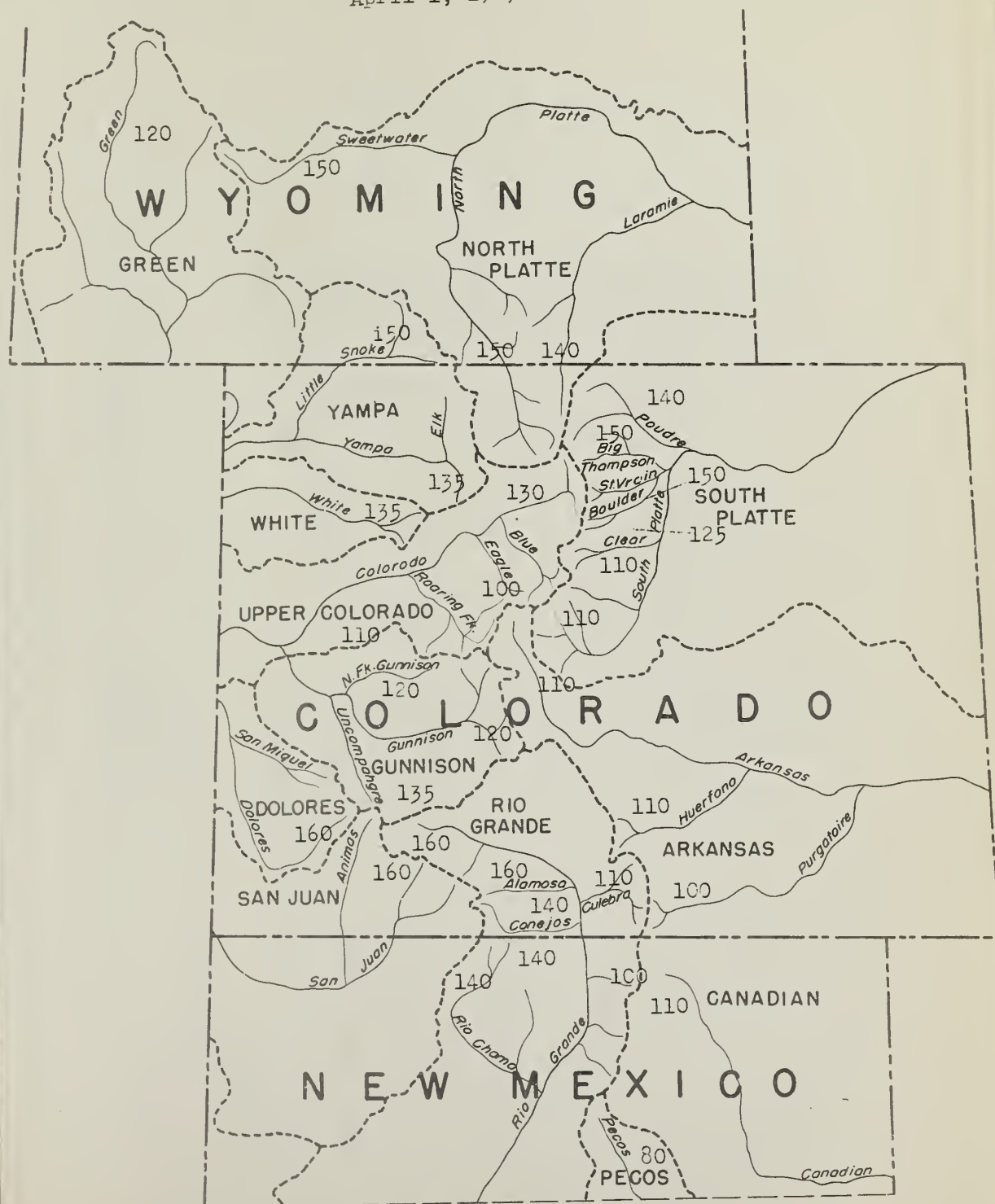
CANADIAN RIVER

On the tributaries to the Canadian River the snow-water content is ten percent above normal but somewhat less than a year ago. Conchas reservoir has in storage 306,500 acre-feet as compared to 371,000 a year ago.

Recent precipitation on the Tucumcari Project area has been much above normal. Soil moisture range and crop conditions are described as excellent.

WATER CONTENT OF SNOW ON THE WATERSHEDS OF
PLATTE, ARKANSAS, UPPER COLORADO AND RIO GRANDE BASINS
BASED ON SNOW SURVEYS MADE APPROXIMATELY FIRST DAY OF MONTH

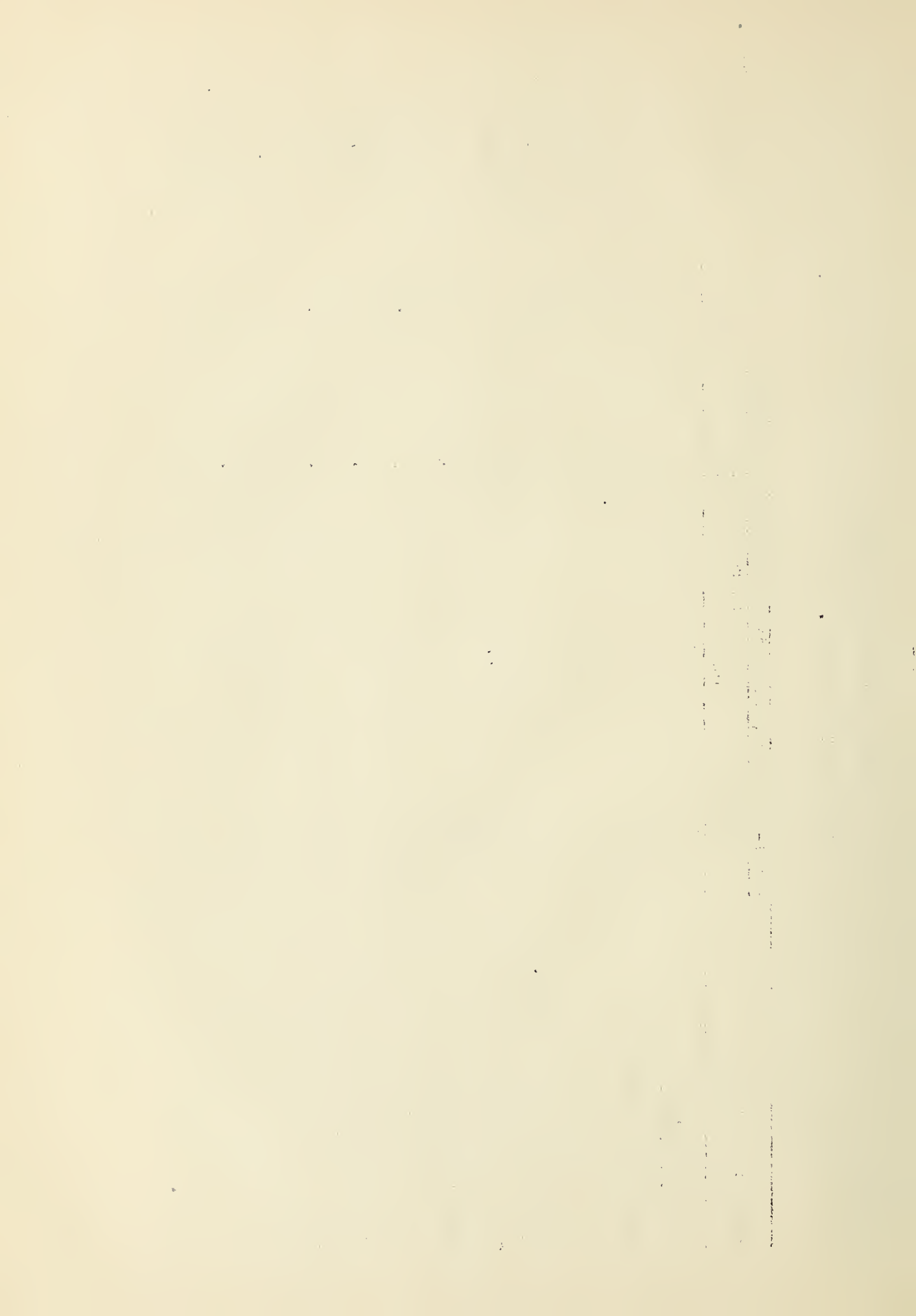
In Percent of Normal
April 1, 1949



RIO GRANDE DRAINAGE BASIN

STREAM FLOW FORECASTS, April 1, 1949

Basin and Stream	April-September, inclusive, Streamflow Acre Feet				10-year avg. 1938-1947
	Forecast 1949	1948	Measured Runoff 1947	1946	
<u>RIO GRANDE</u>					
South Fork at South Fork	180,000		104,000	132,000	129,000
Rio Grande at Del Norte	850,000	823,000	530,000	347,000	553,000
Alamosa above Terrace Res.	115,000		68,000	40,000	76,000
Conejos at Mogote	350,000	262,000	176,000	124,000	214,000
Culebra at San Luis	40,000		43,000	16,000	39,000
Chama at Park View	375,000		148,000	79,000	233,000
Taos at Los Cordovas	15,000		21,000	5,000	44,000
Embudo Creek at Dixon	65,000		27,000	18,000	60,000
Rio Grande at Otowi Bridge	1,500,000	987,000	422,000	204,000	872,000
Rio Grande at San Marcial	1,200,000	727,000	180,000	58,000	691,000
Pecos at Pecos	65,000		38,000	25,000	67,000



SNOW SURVEYS AND IRRIGATION WATER FORECASTS
RIO GRANDE BASIN

STATUS OF RESERVOIR STORAGE, APRIL 1, 1949

STREAM	RESERVOIR	USABLE CAPACITY 1000 A.F.	THOUSANDS OF ACRE FEET IN STORAGE				
			About April 1		1947	1946	10-year Ave. 1938-47
			1949	1948			
RIO GRANDE	Rio Grande	51.1	19.5	24.2	6.9	6.4	16.3
	Santa Maria	43.5	15.8	5.7	5.5	7.5	9.9
	Sanchez	103.0	6.2	9.2	6.7	13.1	16.6
	Terrace	17.7	2.2	6.0	3.6	2.2	3.8
	Continental	26.7	6.0	--	1.2	7.6	6.8
	Elephant Butte	2273.7	530.0	394.1	512.3	1029.9	1139.7
CHAMA RIVER	Caballo	365.0	158.9	171.5	262.8	247.9	183.2
	El Vado	226.0	19.0	26.8	41.0	95.6	61.9
CANADIAN RIVER	Conchas	600.0	306.5	371.0	364.9	341.5	248.3
PECOS RIVER	Alamogordo	148.0		35.6	35.6	40.0	59.3
	McMillan-Avalon	45.1		6.0	4.7	5.0	20.8

SNOW SURVEYS AND IRRIGATION WATER FORECASTS
for
RIO GRANDE BASIN
April 1, 1949

SUMMARY OF APRIL 1 SNOW SURVEYS AND COMPARISON OF DATA WITH THAT OF PREVIOUS YEARS BY
WATERSHEDS

WATERSHEDS	Snow Depth			Water Content		Number Courses in Average	Snow Density		1949 Water Content in percent of	
	Twelve year Avg.*	1948	1949	Twelve year Avg.*	1948		1949	Twelve year Avg.	Percent	Percent
Rio Grande(Colo.	In.	In.	In.	In.	In.		Percent	Percent		
	34.0	46.4	45.0	11.8	14.4	9	35	31		122
Upper Rio Grande	40.3	59.8	60.8	13.3	21.1	3	33	35		159
Alamosa River	43.4	--	57.9	12.8	20.0	2	30			157
Conejos River	52.3	--	61.5	17.3	20.9	3	33			121
Culebra River	35.5	41.3	50.1	10.9	13.7	1	31	33		119
Rio Grande(N.M.)	22.9	33.8	27.8	7.5	10.6	13	33	31		119
Chama River	35.7	39.9	44.8	12.5	13.3	5	35	35		128
Pecos River	13.5	26.7	10.3	4.2	7.6	3	31	28		74
Canadian River	22.5	36.7	26.4	7.0	10.5	4	31	29		110
					7.7					1948

*Some for shorter periods

P R E C I P I T A T I O N D A T A

WATERSHED	STATE	Precipitation October 1 to March 31		Departure from Normal		Precipitation*		Departure from Normal	
		Inches		Inches		March		Inches	
Canadian	New Mexico	4.42		-0.08		0.80		-0.10	
Rio Grande	Colorado	2.64		-0.80		0.46		-0.17	
Rio Grande (N)	New Mexico	6.44		-0.16		1.07		-0.44	
Rio Grande (S)	New Mexico	2.82		-0.43		0.26		-0.22	
Pecos	New Mexico	4.33		-0.08		0.49		-0.28	

*March precipitation tentative

RIO GRANDE DRAINAGE SNOW SURVEYS

April 1, 1949

Drainage Basin and Snow Course	Location				Snow Cover Measurements							
	No. and State	Sec.	Twp.	Range	Elev.	Date of Survey	Snow Depth (Inches)	Water Content (Inches)			Past Record	
								1949	1948	1947	Yrs. of Rec.	Av. Water Content (Inches)
RIO GRANDE IN COLORADO												
Wolf Creek Pass	26 Colo	4	37N	2E	10000	3/31	106.5	42.3	39.3	20.7	13	29.7
Upper Rio Grande	27 "	13	40N	4W	9350	3/28	45.3	11.9	14.3	4.7	13	6.2
Silver Lakes	47 "	15	36N	5E	9600	3/31	31.7	10.4	10.3	3.2	12	5.9
River Springs	49 "	25	33N	6E	9300	4/1	31.2	10.6	9.7	4.2	12	7.1
LaVeta Pass #2	74 "	22	28S	70W	9300	3/31	30.5	9.4	14.6	8.2	13	8.3
Summitville	76 "	30	37N	4E	11500	4/1	84.1	29.5	18.2		19.8
Cumbres Pass #2	77 "	17	32N	5E	10000	3/31	69.3	22.7	21.6	15.2	13	25.2
Santa Maria	80 "	8	41N	2W	9700	3/30	30.5	9.6	8.0	2.0	10	4.1
Culebra	82 "		37.2N	105.2W	10000	3/31	50.1	13.0	13.7	11.4	9	10.9
Ft. Garland	84 "	13	29N	72W	8200	4/3	9.8	1.9	5.0	0.0	9	3.2
Stunner Pass	107 "	16	36N	4W	10550							
Platoro	108 "	22	36N	4W	9950	4/2	78.2	28.3				
West Conejos	109 "	25	35N	4E	9450	4/2	42.5	15.9				
La Manga	110 "	24	32N	5E	10100	3/31	74.1	28.9				
Pyramid	122 "	26	41N	5W	10300	4/6	51.3	17.2				
Spr. Creek Pass	123 "	2	42N	3W	10900	4/5	55.3	18.8				
Pool Table Mt.	124 "	19	41N	2E	10000		42.3	12.4				
Lake Humphreys	125 "	32	40N	1E	9300		47.6	14.5				
Cochetopa Pass	126 "	12	45N	3E	10000	3/31	33.3	8.3	14.1	7.7		11.8
Average for drainage												
UPPER RIO GRANDE												
Wolf Creek Pass	26 Colo.	4	37N	2E	10000	3/31	106.5	42.3	39.3	20.7	13	29.7
Upper Rio Grande	27 "	13	40N	4W	9350	3/28	45.3	11.9	14.3	4.7	13	6.2
Santa Maria	80 "	8	41N	2E	9700	3/30	30.5	9.6	8.0	2.0	10	4.1
Pyramid	122 "	26	41N	5W	10300	4/6	51.3	17.2				
Spr. Creek Pass	123 "	2	42N	3W	10900	4/5	55.3	18.8				
Pool Table Mt.	124 "	19	41N	2E	10000		42.3	12.4				
Lake Humphreys	125 "	32	40N	1E	9300		47.6	14.5	20.8	9.1		13.3
Average for drainage												

RIO GRANDE DRAINAGE SNOW SURVEYS
April 1, 1949

Drainage Basin and Snow Course	Location				Snow Cover Measurements							
	No. and State	Sec.	Twp. or Lat.	Range or Long.	Elev. or Long.	Date of Survey	Snow Depth (Inches)	Water Content (Inches)			Past Record	
								1949	1948	1947		
ALAMOSA RIVER Silver Lakes Summitville	47 Colo.	15	36N	5E	9600	3/30	31.7	10.4	10.3	3.2	12	5.9
	76 "	30	37N	4E	11500	4/1	84.1	29.5	--	18.2	9	19.8
			Average for drainage				57.9	20.0	--	10.7		12.8
CONEJOS RIVER River Springs Summitville* Cumbres Pass**#2 Platoro West Conejos La Manga	49 Colo.	25	33N	6E	9300	4/1	31.2	10.6	9.7	4.2	12	7.1
	76 "	30	37N	4E	11500	4/1	84.1	29.5	--	18.2		19.8
	77 "	17	32N	5E	10000	3/31	69.3	22.7	21.6	15.2	13	25.2
	108 "	22	36N	4W	9950	4/2	78.2	28.3				
	109 "	25	35N	4E	8450	4/2	42.5	15.9				
	110 "	24	32N	5E	10100	3/31	74.1	28.9	--	12.8		17.3
CULEBRA RIVER Culebra	82 Colo.		Average for drainage				61.5	20.9				
			37.2N	105.2W	10000	3/31	50.1	13.0	13.7	11.4	9	10.9
RIO GRANDE IN NEW MEXICO												
CHAMA RIVER Cumbres Pass #2 Canjilon Pay Role Chama Divide Chamita	77 Colo.	17	32N	5E	10000	3/31	69.3	22.7	21.6	15.2	13	25.2
	6 N.M.	4	26N	6E	9500	4/1	32.8	14.0	15.1	18.0	12	16.4
	15 "	16	28N	7E	9700	3/30	42.9	14.8	15.1	5.4	9	9.4
	17 "		36.9N	106.7W	7750	4/3	32.0	13.2	5.2	0.0	9	2.8
	18 "		36.9N	106.7W	8500	4/3	47.1	15.1	12.6	4.2	7	8.6
			Average for Drainage				44.8	16.0	13.9	8.6		12.5

*On adjacent drainage

April 1, 1949

*On adjacent drainage

*On adjacent drainage

The following organizations cooperate in the snow survey and irrigation water study projects for the Colorado, Missouri-Arkansas and Rio Grande watersheds in Northern Plains or northwest.

STATES

Colorado State Engineer
Young State Engineer
Utah State Engineer
New Mexico State Engineer
Arkansas State Engineer
Missouri State Engineer
Colorado Department Station
Colorado Technical Service
Arkansas Department Station
Utah Department Station

FEDERAL

Department of Agriculture
Forest Service
Soil Conservation Service
Department of Interior
Bureau of Reclamation
Geological Survey
National Park Service
Department of Commerce
Marine Corps
War Department
Army Engineer Corps

PUBLIC UTILITIES

Colorado Public Service Company
Western Colorado Power Company
Arkansas Power Company
Public Service Company of New Mexico
Denver and Rio Grande Traction Co., Inc. Company

MUNICIPALITIES

City of Denver
City of Aurora
City of Boulder

WATER USERS ORGANIZATIONS

Frontier Valley Water Users' Association
Arkansas Valley Water Association
Colorado River Water Conservation District

IRRIGATION DISTRICTS

Denver Waterworks and Irrigation Company
San Luis Valley Irrigation District
South West Waterworks Company
Castillo Land Company
Montgomery Valley Water Users' Association
Wyoming Development Company
Goshute Irrigation District
Boulder Project
Boulder Irrigation District
Little River Valley Water Users' Association
San Carlos Irrigation and Drainage District
West Valley Waterworks and Canal Company

Many other organizations and individuals furnish valuable information for the snow survey studies. Their cooperation is gratefully acknowledged.

